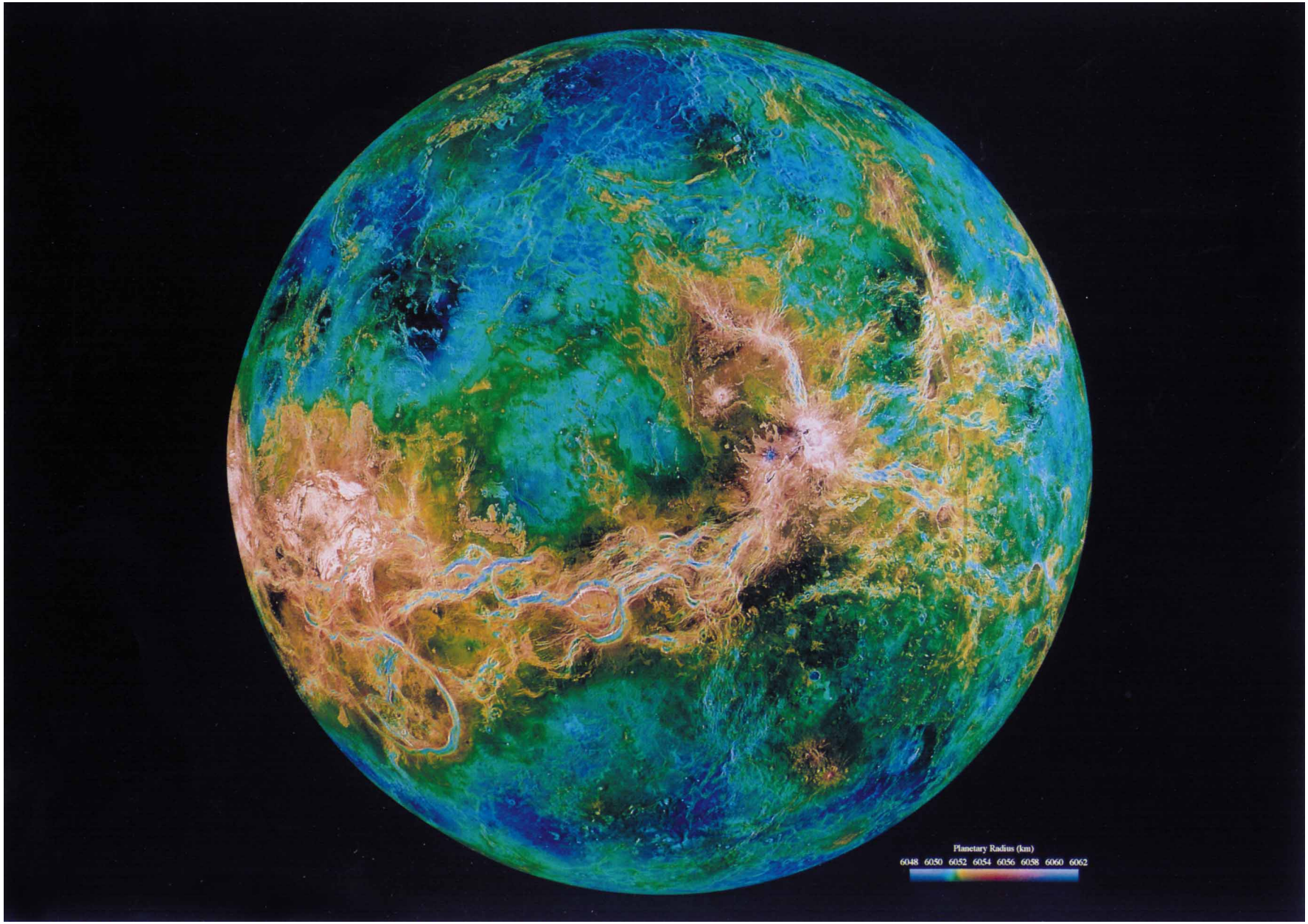
National Aeronautics and
Space Administration

Venus ♀



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At first glance, if Earth had a twin, it would be **VENUS**. The two planets are similar in size, mass, composition, and distance from the Sun. But the similarities end there. Venus has no oceans, and its scorching surface temperatures of about 484°C (900°F) could melt lead. Venus hides behind a persistent global shroud of sulfuric acid clouds in an atmosphere composed mostly of carbon dioxide. The atmosphere is so dense that it crushes down on the planet's surface with a pressure equal to that found at 3,000-foot depths in Earth's oceans. Oddly, Venus rotates in a direction opposite that of Earth, which means that if you were standing on Venus, you would see the Sun rising in the west and setting in the east. Its sluggish rotation makes one Venus "day" last as long as 243 Earth days.

Because of its convenient orbit and scientific interest, Venus has been visited by more spacecraft, both U.S. and Russian, than any other planet, with flyby missions, orbiters, surface landers, and even atmosphere-floating balloons. In 1962, the U.S. launched Mariner 2, the first successful probe to flyby another planet. Mariner 2's flyby verified Venus' high temperatures. Since then, there has been a series of successful space-flight missions to Venus (see "Significant Dates"), revealing more and more about the cloud-veiled planet.

Despite the wealth of valuable data given to us by these missions, we still had only a rough sketch of the face of Venus. The Pioneer Venus and Venera spacecraft were able to image the surface with radar, thus answering many of our questions about large-scale surface features, but many more questions remained unanswered about the extent to which the surface has been shaped by volcanoes, plate tectonics, impact craters, and water and wind erosion. To address these questions, NASA, in 1989, launched a new radar imaging spacecraft named Magellan, named after the early Portugese explorer Ferdinand Magellan, whose fleet was the first to circumnavigate Earth.

Magellan arrived at Venus on August 10, 1990. During its mission, Magellan used synthetic aperture radar to penetrate the thick atmosphere of Venus and return the highest resolution images ever taken of 98% of the planet's surface. Magellan revealed that at least 85% of Venus is covered by volcanic rock—mostly lava flows that form vast plains. Much of the remaining surface is mountainous terrain deformed repeatedly by geologic activity. In addition, more than 900 impact craters are randomly scattered over the Venusian surface. Because no rainfall, oceans, or strong winds exist on Venus, little erosion occurs.
After two years of radar mapping, Magellan began acquiring global gravity data in September 1992. In the summer of 1993, the spacecraft's orbit was changed to bring it closer to the planet for additional observations of the atmosphere and gravity. The mission ended in October 1994.

From data returned by Magellan, scientists will create and study maps of Venus for years to come. With Venus' face unveiled, we now have a better understanding of Earth's fraternal twin, and a store of information that will help us understand the evolution of our own planet.

Fast Facts

Namesake	Roman Goddess of Love and Beauty
Distance from Sun	108.2 Million Kilometers
Period of Revolution (One Venusian Year)	0.62 Earth Years
Equatorial Diameter	12,100 Kilometers
Atmosphere (Main Component)	Carbon Dioxide
Inclination of Orbit to Ecliptic	3.4°
Eccentricity of Orbit	.007
Rotation Period (One Venusian Day)	243 earth Days (Retrograde)
Inclination of Axis	177.2°

Significant Dates

1962 — Mariner 2 (U.S.) flew by Venus (12/14/62); verified high temperatures.
1970 — Venera 7 (U.S.S.R.) soft landed on Venus (12/15/70).
1972 — Venera 8 (U.S.S.R.) landed on Venus (7/22/72); transmitted nearly an hour of data.
1974 — Mariner 10 (U.S.) bound for Mercury, flew by Venus (2/5/74); tracked global atmospheric circulation with visible and violet imagery.
1975 — Venera 9 (U.S.S.R.) sent the first surface pictures of Venus via its orbiter (10/22/75).
1978 — Pioneer Venus Orbiter (U.S.) radar mapped Venus (12/78); Pioneer Venus Multiprobe (U.S.) dropped four probes through Venusian clouds.
1983 — Veneras 15 and 16 (U.S.S.R.) provided high-resolution mapping radar and atmospheric analyses.
1984 — Vegas 1 and 2 (U.S.S.R.) dropped off landers and balloon probes at Venus while en route to Halley's comet.
1989 — Magellan (U.S.) was launched toward Venus (5/4/89).
1990 — Magellan arrived at Venus and mapped 98% of the planet. Mission ended in 1994.

About the Image

This mosaic of Venus was composed from Magellan images taken during radar investigations from 1990–1994, centered at 180° east longitude. Magellan spacecraft imaged more than 98% of venus' surface at a resolution of about 100 meters. This image has an effective resolution of about 3 kilometers. Gaps in the Magellan coverage were filled with images from Earth-based Arecibo radar in a region roughly centered at 0° latitude and longitude and near the south pole. This mosaic was color-coded to represent elevation. Missing elevation data from the Magellan radar altimeter were filled with altimetry from the Venera spacecraft and the U.S. Pioneer Venus missions. Brown areas denote rough terrain; the dark blue areas are smooth surfaces or possibly areas covered with dust.

References
1) Views of the Solar System—Venus http://bang.lanl.gov/solarsys/venus.htm
2) Planetary Photo Journal: http://photojournal.jpl.nasa.gov/
3) Stardate, The University of Texas of Austin, McDonald Observatory, 2609 University Ave., #3.118, Austin, TX 78712

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